MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole Log Data Report

Log Event A

Borehole # 50-01-04

Borehole Information

Farm :	T	**Tank :**	T-101	**Site Number :**	299-W10-102
N-Coord :	43,632	**W-Coord :**	75,595	**TOC Elevation :**	674.18
Water Level, ft :	121.0	**Date Drilled :**	7/31/1973		

Casing Record

Type :	Steel-welded	Thickness, in. :	0.237	ID, in. :	4
Top Depth, ft. :	0	Bottom Depth, ft. :	123		
Type :	Steel-welded	Thickness, in. :	0.280	ID, in. :	6
Top Depth, ft. :	0	Bottom Depth, ft. :	123		

Cement Bottom, ft. : 123 **Cement Top, ft. :** 0

Borehole Notes:

Borehole 50-01-04 was drilled in July 1973 and completed to a depth of 87 ft using 6-in.-diameter casing. In February 1981, this borehole was deepened to 123 ft using 6-in.-diameter casing. During the extension activities, the borehole was modified by perforating the 6-in. casing from 0 to 20 ft and 80 to 123 ft, installing a 4-in. casing inside the 6-in. casing, and filling the annular space with grout.

The zero reference for the SGLS was the top of the 4-in. casing, which is approximately even with the ground surface.

Equipment Information

Logging System :	2B	**Detector Type :**	HPGe	**Detector Efficiency:**	35.0 %
Calibration Date :	11/1997	**Calibration Reference :**	GJO-HAN-20	**Logging Procedure :**	MAC-VZCP 1.7.10-1

Logging Information

Log Run Number :	1	**Log Run Date :**	06/30/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	0.0	**Counting Time, sec.:**	200	**L/R :** L **Shield :**	N
Finish Depth, ft. :	20.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	2	**Log Run Date :**	06/30/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	19.0	**Counting Time, sec.:**	200	**L/R :** R **Shield :**	N
Finish Depth, ft. :	32.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

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Log Run Number :	3	**Log Run Date :**	07/01/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	31.0	**Counting Time, sec.:**	200	**L/R :** R	**Shield :** N
Finish Depth, ft. :	93.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	4	**Log Run Date :**	07/02/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	122.5	**Counting Time, sec.:**	200	**L/R :** R	**Shield :** N
Finish Depth, ft. :	92.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Logging Operation Notes:

This borehole was logged in four log runs. The total logging depth achieved by the SGLS was 122.5 ft. Log runs two, three and four were collected using real time for 200 s because of the excessive dead time between 19 and 122.5 ft. During logging, this borehole contained standing water below 121.1 ft.

Analysis Information

Analyst : R.R. Spatz

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 10/23/1998

Analysis Notes :

The pre-survey and post-survey field verification for each logging run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

The casing correction factor for a 0.517-in.-thick steel casing was applied to the concentration data during the analysis process. A grout correction was not made because none is available. A water correction was not applied.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

A plot that compares spectral gamma-ray data from a 1992 RLS survey and a 1998 SGLS survey is included.

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Results/Interpretations:

The radionuclide concentrations identified in this section are reported as apparent concentrations only and are underestimated.

The only man-made radionuclide detected in this borehole was Cs-137. Cs-137 contamination was detected continuously from the ground surface to 20.5 ft at concentrations ranging from 0.2 to 45 pCi/g. Detector saturation occurred from 21 to 54 ft and 58.5 to 67.5 ft because of a high radiation field. As a result, no spectral data were collected in those regions of the borehole. From 68 to 90 ft, continuous Cs-137 contamination was measured at concentrations ranging between 1,075 and 3,430 pCi/g. Between 90.5 and 109 ft, the concentrations of Cs-137 contamination ranged between 540 and 9,650 pCi/g. Concentrations of Cs-137 contamination increased from 109.5 to 122.5 ft and ranged between 4,500 and 10,040 pCi/g.

The K-40 concentrations varied from 6 to 11 pCi/g between the ground surface and 21 ft. K-40 concentrations were detected sporadically from 74 to 122.5 ft and ranged between 5 and 10 pCi/g. At 83 and 83.5 ft, the K-40 concentrations increased to about 25 pCi/g. Th-232 concentrations increased to about 1 pCi/g between 83 and 91.5 ft.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank T-101.